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EXAMINER	
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ART UNIT	**PAPER NUMBER**
1639	17

DATE MAILED: 08/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/833,030	Applicant(s) HEVESI ET AL.	
	Examiner My-Chau T. Tran	Art Unit 1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *11 and 12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 13* is/are rejected.

7)☒ Claim(s) *13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *16* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/27/03 has been entered.

2. Applicant's amendment filed 5/27/03 in Paper No. 14 is acknowledged and entered. Claim 13 is added by the amendment.

3. Claims 2-13 are pending.

Election/Restrictions

4. Claims 11-12 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 7.

5. Claims 2-10 and 13 are treated on the merit in this Office Action.

Claim Objections

Claim 13 is objected to because of the following informalities: Claim 13 is objected to as an improper dependent claim since it depends on cancel claim 1 that result in a broken pendency

chain. However in order to further prosecution, Claim 13 is interpreted to depend on claim 2.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 2-10 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a) Claim 2 recites the limitation "discrete surface regions" in line 9. There is insufficient antecedent basis for this limitation in claim 2.

b) Clarification is needed as to which "type of covalent binding" of claim 2 it is referring to that result in an array (e.g. the binding of the aldehyde to the capture molecule or the binding of the capture molecules to the complementary molecules).

c) The term "density" of claim 2 is a relative term, which renders the claim indefinite. The term "density" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably appraised of the scope of the invention (e.g. the density of the aldehyde function or the density of the capture molecules or the density of the binding of the capture molecule to the complementary molecules).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 2, 5-10, and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Wagner et al. (US Patent 6,329,209 B1).

Wagner et al. disclose a method of producing an array of protein-capture agents (capture molecules) wherein the protein-capture agent is immobilized onto an organic thin film on the substrate surface to form a plurality of patches of protein-capture agents on discrete, known regions (discrete regions) of the surface of a substrate (col. 3, lines 58-67 to col. 4, lines 1-2). The substrate comprises material such as glass, controlled pore glass, or silicon (col. 13, lines 59-65). The organic thin film on the substrate is modified by oxidizing the polymeric surface (olefinic groups) to form polar functionalities such as carboxylic acids or aldehydes (col. 14,

lines 15-28) (referring to step (a) of claim 2). They are several methods of immobilizing the protein-capture agents to the reactive surface of a substrate to form a two-dimensional arrays of the protein-capture agents wherein on such method is using commercially available arrayer (col. 16, lines 42-56) (refers to step (b) of claim 2 and claim 13). Protein-capture agent includes polynucleotide, antibodies, or antigens (col. 4, lines 48-67). The array comprises 100 or more patches within a total area of about 1 cm^2 (col. 10, lines 49-52) (refers to 'an array comprises a density of at least 4 or more discrete regions/cm^2"). Therefore, the method of Wagner et al. anticipates the presently claim methods.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (US Patent 6,329,209 B1) and Barner et al. (US Patent 5,986,066).

Wagner et al. disclose a method of producing an array of protein-capture agents (capture molecules) wherein the protein-capture agent is immobilized onto an organic thin film on the substrate surface to form a plurality of patches of protein-capture agents on discrete, known regions (discrete regions) of the surface of a substrate (col. 3, lines 58-67 to col. 4, lines 1-2). The substrate comprises material such as glass, controlled pore glass, or silicon (col. 13, lines 59-65). The organic thin film on the substrate is modified by oxidizing the polymeric surface (olefinic groups) to form polar functionalities such as carboxylic acids or aldehydes (col. 14, lines 15-28) (referring to step (a) of claim 2). They are several methods of immobilizing the protein-capture agents to the reactive surface of a substrate to form a two-dimensional arrays of the protein-capture agents wherein on such method is using commercially available arrayer (col. 16, lines 42-56) (refers to step (b) of claim 2 and claim 13). Protein-capture agent includes polynucleotide, antibodies, or antigens (col. 4, lines 48-67). The array comprises 100 or more patches within a total area of about 1 cm^2 (col. 10, lines 49-52).

The method of Wagner et al. does not expressly disclose that the oxidations of the olefinic groups is performed in permanganate and periodate solution.

Barner et al. teaches a method of oxidizing octenyl trichlorosilane, an olefin on a solid surface, with permanganate and periodate to form a functional group for immobilizing a protein (col. 8, lines 36-47; col. 3, lines 60-65). The immobilization of the biological or chemical molecules on a solid support results in an array with discrete regions (col. 2, lines 6-17; fig. 1-3).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include that the oxidation of the olefinic groups is performed in a permanganate and periodate solution as taught by Barner et al. in the method of Wagner et al. One of ordinary skill in the art would have been motivated to include that the oxidation of the olefinic groups is performed in a permanganate and periodate solution in the method of Wagner et al. since both Wagner et al. and Barner et al. disclose the method of oxidizing the olefinic groups that result in a polar functionalities such as carboxylic acids or aldehydes. Therefore the type of oxidation use to oxidize the olefinic groups would be a choice as experimental design and is considered within the purview of the prior art.

13. Claims 2-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barner et al. (US Patent 5,986,066) in view of either Weetall (*Applied Biochemistry and Technology*, 41:157-188, **1993**) or Sundberg et al. (Us Patent 5,624,711).

Barner et al. teaches a method of oxidizing octenyl trichlorosilane, an olefin on a solid surface, with permanganate and periodate to form a functional group for immobilizing a protein (col. 8, lines 36-47; col. 3, lines 60-65). The immobilization of the biological or chemical molecules on a solid support results in an array with discrete regions (col. 2, lines 6-17; fig. 1-3).

The method of Barner et al. does not expressly disclose that aldehyde as a functional group and the solid support is glass.

Weetall and Sundberg et al. disclosed having an aldehyde as a functional group for the immobilization of biological or chemical molecules (Weetall: pg. 167, Fig. 6; pg. 165, lines 25-28 to pg. 166, lines 1-4; Sundberg et al.: fig. 8). The solid support is glass (Weetall: pg. 158,

lines 38-39; Sundberg: Fig. 8-11; col. 11, line 10). The immobilization of the biological or chemical molecules on a solid support results in an array with discrete regions (Weetall: pg. 181, lines 30-32; Sundberg: col. 6, lines 18-35). Sundberg et al. further disclose several methods of immobilizing the biological or chemical molecules onto a solid support (col. 6 thru col. 8, lines 1-55). One such method is the spotting method wherein "a dispenser (an arrayer) moves from region to region, depositing only as much monomer as necessary at each stop. Typical dispensers include a micropipette to deliver the monomer solution to the substrate and a robotic system to control the position of the micropipette with respect to the substrate, or an ink-jet printer" (Sundberg: col. 8, lines 9-14).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Barner et al. by including the aldehyde functional group as taught by Weetall and Sundberg et al. because it is well known that any suitable functional group such as an aldehyde, a carboxylic acid or amine can be use for the immobilization of biological or chemical molecules (Weetall: pg. 166, lines 3-23; Sundberg et al.: Fig. 8-11; col. 2, line 19-24; col. 16, lines 32-37; col.3, lines 60-65). Therefore, it would have been an obvious matter of design choice to have an aldehyde functional group rather than a carboxylic acid group (Barner et al.). This is particularly true since in the Barner et al. process it would be expected that the octenyl group would first be oxidized to an aldehyde and then further oxidized to the carboxylic acid. Since applicant has not disclosed that the aldehyde functional group solves any stated problem or is for any particular purpose, it appears that the invention would perform equally well with either an aldehyde or a carboxylic acid as a functional group.

Response to Amendment

14. The declaration under 37 CFR 1.132 filed 4/29/03 is insufficient to overcome the rejection of claims 2-10 based upon Barner et al. (US Patent 5,986,066) in view of either Weetall (*Applied Biochemistry and Technology*, 41:157-188, **1993**) or Sundberg et al. (Us Patent 5,624,711) applied as under 35 U.S.C. 103(a) as set forth in the last Office action because:

a) It is not commensurate to the presently claimed invention, which is a ***method for making microarrays by oxidizing the olefin on the solid support to form the aldehyde functional group for immobilizing a biological molecule.***

b) The objective evidence of the declaration does not show how the method steps of the current elected invention is nonobvious over the method steps of the prior art that is the oxidation of an olefin on the solid support to form the aldehyde functional group for immobilizing a biological molecule.

c) There are no comparisons that would demonstrate how the method steps of the current elected invention are an improvement from the method steps of the prior art.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

Response to Arguments

15. Applicant's argument(s) directed to the above rejection under 35 USC 103(a) as being unpatentable over Barner et al. (US Patent 5,986,066) in view of either Weetall (*Applied Biochemistry and Technology*, 41:157-188, **1993**) or Sundberg et al. (Us Patent 5,624,711) for claims 2-10 were considered but they are not persuasive for the following reasons.

Applicant argues that "[t]he present invention is not taught or suggested by the Barner et al. in view of Weetall or Sundberg et al., as Barner et al. clearly teaches away from the invention as claimed" in that "[t]he process of Barnes produces an aldehyde only as a transient intermediate in a reaction which produces a carboxylic acid as an end product" and "[T]he high concentrations of potassium permanganate (2.5 mM) together with high concentration of sodium periodate (100 mM) in Barner et al. would also cause the presence of the aldehyde in the reaction mixture to be transitory." In the presently claimed method "[t]he aldehyde functions is the end product of the mild oxidation of olefinic groups by 0.5 nM potassium permanganate and 20mM sodium periodate (page 9, line 14 of the specification), the method of Barner et al. teaches away from the presently claimed method. Additionally, "[i]n the methods of Barner the carboxylic acid is converted into an N-hydroxylsuccinimide ester in the presence of pyridine and the biological molecules are attached to the ester." Further, "[t]here is no motivation to combine the method of Barner et al. with Weetall or Sundberg et al."

Applicant's arguments are not convincing since the method of Barner et al. in view of Weetall or Sundberg et al. do teach or suggest the method of present invention. Although the end product of the method of Barner et al. is carboxylic acid, the oxidation method with permanganate and periodate is also well known to produce the final product of aldehyde (Carey et al., *Advanced Organic Chemistry, 3rd Edition*, **1990**, pg. 647-648). Therefore the choice of end product would be a choice as experimental design and is considered within the purview of the prior art.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the aldehyde

functions is the end product of the mild oxidation of olefinic groups by 0.5 nM potassium permanganate and 20mM sodium periodate (page 9, line 14 of the specification)) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Additionally with regard to the additional method step of Barner et al. wherein "the carboxylic acid is converted into an N-hydroxylsuccinimide ester", the "comprises" terminology of the instant Claim 2 is open-ended and does not exclude possible additional method step such as those described by Barner et al.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it is well known that any suitable functional group such as an aldehyde, a carboxylic acid or amine can be use for the immobilization of biological or chemical molecules (Weetall: pg. 166, lines 3-23; Sundberg et al.: Fig. 8-11; col. 2, line 19-24; col. 16, lines 32-37; col.3, lines 60-65). Therefore, it would have been an obvious matter of design choice to have an aldehyde functional group rather than a carboxylic acid group.

Therefore, the method of Barner et al. in view of Weetall or Sundberg et al. do teach or suggest the method of present invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to My-Chau T. Tran whose telephone number is 703-305-6999. The examiner is on ***Increased Flex Schedule*** and can normally be reached on Monday: 8:00-2:30; Tuesday-Thursday: 7:30-5:00; Friday: 8:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew J. Wang can be reached on 703-306-3217. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9307 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1123.

mct
July 31, 2003

PADMASHRI PONNALURI
PRIMARY EXAMINER